REMARKS

Claims 1-11 and 16-18 stand in the present application, claims 1, 3, 6, 8 and 18 having been amended. In view of these claim amendments and the following remarks, all of the claims are believed to overcome the prior art rejections from the parent case.

In the parent case Office Action, the Examiner rejected claims 1-11 and 18 under 35 U.S.C. § 102(e) as being anticipated by Otsuka et al. and rejected claims 16 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Otsuka et al. in view of Kleijn et al. Applicants respectfully traverse the Examiner's §§ 102 and 103 rejections of the claims.

As noted above, Applicants have amended the claims in order to clarify their inventions and to more clearly patentably define over the cited art.

Support for the claim amendments can be found in the present application at page 2, line 5 (which indicates that voiced speech comprises successive pitch pulses of similar, but not identical, shape), and page 2, line 9 (which indicates that an estimate of the progression of the speech signal from cycle to cycle is provided). It follows that the estimate of the progression is data defining the change in shape of said cycles from cycle to cycle. That the progression referred to is that of the portion of the waveform in the temporal vicinity of the synthetic waveform sample is clear from page 13, lines 26 to 29. Also, claim 1 as originally filed stated that the transformation data applied in the temporal vicinity of the synthetic waveform sample.

Otsuka describes a speech synthesis apparatus in which multiple pitch waveforms are generated and joined together to form a speech waveform. A character series of phonetic text is input and split into frames. A parameter series is generated for

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each frame. An example of the data structure for one frame of parameters is shown in

Figure 8 from which it is clear that a parameter series comprises three separate

parameters al of which apply over one whole frame. Pitch waveforms are generated

using a synthesis parameter and a pitch scale. Both the synthesis parameter and the

pitch scale are parameters in the parameter series and both of them are interpolated

during the pitch waveform generation process using a frame time length and a

waveform point number. The generated pitch waveforms are then linked and output as

synthesized speech.

The Examiner's rejection of claim 1 will now be discussed section by section.

"A method of generating a cycle sound waveform corresponding to a sequence
of substantially similar cycles..."

The Examiner has made no comments on this section of the claim and has not

said what part of Otsuka he is interpreting as the "substantially similar cycles." Although

this is the preamble of the claim, it becomes important since "said cycles" are referred

to later on in the claim.

"(a) generating a cyclical sound waveform sample..."

At page 7 of the Office Action, the Examiner states that "it is clear that waveform

sample could be a parameter of each pitch or a pitch waveform for a speech waveform."

First, it is not exactly clear to Applicants what this means but it is assumed that the

Examiner means that a waveform sample could be either a parameter for each pitch or

a parameter of a pitch waveform for speech waveform. However, this raises the

question as to what the Examiner means by "parameter." As already mentioned above,

in Otsuka et al. a parameter series is generated for each frame and each parameter

series comprises three different parameters. From the Examiner's comments on page

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7, referring to the cited reference at column 2, it is assumed that when the Examiner refers to a parameter, he is referring to the synthesis parameter p(m).

As noted in the previous Amendment, the word "sample" is defined in Communications Standard Dictionary, 2nd Edition, 1989, Martin H. Weik (ISBN 0-442-20556-2) on page 1005 (and therefore would be understood by a person of ordinary skill in the pertinent art) as "the value of a specific parameter (characteristic), such as the amplitude, frequency, phase or direction of a signal at a chosen instant." The present application states at page 7, lines 9-11 that "each of the records comprises respective waveform recording 11, comprising successive digital values...as successive samples $x_1, x_2...x_n$."

As mentioned above, the Examiner is attempting to argue that the "synthesis parameter p(m)" of Otsuka et al. could be interpreted as the "waveform sample" of claim 1. In relation to this interpretation, Applicants note column 2, line 40, of Otsuka et al. where it appears that a "parameter" is associated with an impulse response waveform. In fact, if one considers column 5, lines 26-40, the synthesis parameter p(m) is simply a multiple of an impulse response h(m).

By the definition given above, a waveform sample is the value of a specific parameter of a waveform at a chosen instant. Therefore, a multiple of an impulse response waveform (i.e., synthesis parameter p(m) which comprises not just one but many values and which applies to the entire duration of one frame) cannot be said to be a waveform sample.

"(b) generating a successive cyclical sound waveform sample from said cyclical sound waveform sample and transformation data wherein said transformation data comprise data defining the evolution of said cycles in a temporal vicinity of said cyclical sound waveform..."

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Applicants respectfully submit that the Examiner has failed to show, in (a), how Otsuka et al. describes the generation of a cyclical sound waveform sample. This is where the Examiner's failure to say what part of Otsuka et al. he is interpreting as the "substantially similar cycles" matters, since "said cycles" are referred to in this section of the claim. Furthermore, even taking into account the Examiner's comments on pages 3 and 8 of the Office Action, it is not clear which part of the Otsuka et al. reference the Examiner is interpreting as the "transformation data...defining the evolution of said cycles." Finally, the synthesis parameter p(m) of Otsuka et al. is employed to generate a pitch waveform (or an unvoiced waveform) and is _not_ employed to generate a successive sample, as is required by claim 1.

"(c) designating said successive cyclical sound waveform sample as a cyclical sound waveform sample and repeating (b)..."

"(d) repeating (c) a plurality of times to generate a sequence of said successive cyclical sound waveform samples corresponding to a plurality of said cycles..."

Applicants respectfully submit that the Examiner has failed to show how Otsuka et al. teaches or suggests (b) or (c), or describes the generation of a successive cyclical sound waveform sample. Furthermore, the Examiner has failed to say what part of Otsuka et al. he is interpreting as the "cycles."

"(e) outputting the samples of said sequence to generate a waveform representing a cyclical sound."

In relation to this step, the Examiner comments that "a speech waveform can be generated..." However, it is respectfully submitted that the Examiner is interpreting the

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synthesis parameter p(m) as a waveform sample and p(m) is not an output as would be required by the claim.

Accordingly, Applicants respectfully submit that Otsuka et al. does not teach or suggest any of the steps required by claim 1. Claim 18, as amended, now more clearly recites apparatus features that correspond to the method steps of claim 1 and, hence, claim 18 is believed to patentably define over Otsuka et al. for the same reasons given above with respect to claim 1.

Claims 2 to 11 are novel at least by virtue of their dependency on claim 1. Some additional comments regarding these dependent claims are made below.

The passage referred to by the Examiner in respect of claim 3 teaches the generation and linking together of pitch waveforms with shifted phrases and a parameter that is acquired at a specific sampling frequency to generate pitch waveforms. The comments that the Examiner makes with respect to this claim on page 7 of the Office Action do not shed any light on what he is interpreting as the "transformation data...defining the evolution of said cycles" as now recited in amended claim 1. Accordingly, the passage cited by the Examiner does not make any mention of such data and as such cannot teach or suggest that feature of claim 3.

Claim 4 requires there to be a reference stored speech waveform. However, a speech waveform is precisely what Otsuka et al. is trying to achieve by first generating multiple pitch waveforms and then joining the multiple pitch waveforms together to form a speech waveform. The generation of pitch waveforms is what the passage cited by the Examiner describes.

The subject matter of claim 5 is a multidimensional state space representation of a signal in which successive pitch pulse cycles are superposed to estimate the progression of the signal within each cycle and from cycle to cycle. It is not clear to Applicants how this passages teaches two-dimensional state space as the Examiner contends on page 8 of the Office Action. It seems likely that the Examiner has attributed no meaning to "state of space" and believes that any entity represented in 2D space suffices, the two dimensions being amplitude and time. In fact, it is clear from the present specification on pages 4-6 (and it would be clear to someone skilled in the art) that a state space is essentially a graph in which each axis is associated with one dynamic variable, i.e., a variable that varies with time. Therefore the passage referred to by the Examiner, which teaches the generation of a pitch waveform from a synthesis parameter and a pitch scale, does not teach or suggest the features of claim 5.

The passage referred to by the Examiner in respect of claim 6 does not make any mention of any data that defines a transformation followed by cycles in the temporal vicinity of a cyclical sound waveform sample and as such cannot teach or suggest that feature of the claim.

On page 8 of the Office Action, the Examiner contends that the wavepoint number is a random number. According to the Concise Oxford Dictionary Tenth (revised) Edition 2001, the definition of random is "made, done, or happening without method or conscious decision." The passage referred to by the Examiner in respect of claim 10 teaches to set an internal register of a wavepoint number memory to 0, to initialize a parameter series counter to 0 and to fetch parameters for the ith and $(i+1)^{th}$

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frames. It is not clear, therefore, how the setting of the wavepoint number to 0 can be described as random.

With respect to claims 16 and 17, the Examiner cites column 4, line 24 to column 5, line 4 against claims 16(a) and 17(a). Nowhere in this passage does it mention n-dimensional state space representations of voiced speech signals referred to in the claim and also described on pages 4-6 of the present application. It Is clear from the present specification (and it would be clear to someone skilled in the art) that a state space is essentially a graph in which each axis is associated with one dynamic variable. The Examiner's comment on page 8 of the Office Action that "wavepoint point number n_w as a 2-dimension state space" is simply not relevant. Hence the prior art does not teach all the claim limitations and therefore the Examiner has failed to establish a prima facie case of obviousness against claims 16 and 17.
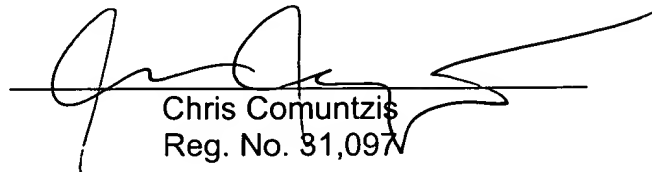
Therefore, in view of the above amendments and remarks, it is respectfully requested that the application be reconsidered and that all of claims 1-11 and 16-18, standing in the application, be allowed and that the case be passed to issue. If there are any other issues remaining which the Examiner believes could be resolved through either a supplemental response or an Examiner's amendment, the Examiner is respectfully requested to contact the undersigned at the local telephone exchange indicated below.

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Attached hereto is a marked-up version of the changes made to the specification

and claim(s) by the current amendment. The attached page(s) is captioned **"Version**

With Markings To Show Changes Made."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

1. (Thrice Amended) A method of generating a cyclical sound waveform corresponding to a sequence of substantially similar cycles, said method comprising:

(a)   generating a cyclical sound waveform sample;

(b)   generating a successive cyclical sound waveform sample from said cyclical sound waveform sample and transformation data, wherein said transformation data comprise data defining the evolution of [a transformation followed by] said cycles in a temporal vicinity of said cyclical sound waveform and the change in shape of said cycles in said temporal vicinity from cycle to cycle [sample];

(c)   designating said successive cyclical sound waveform sample as a cyclical [cyclic] sound waveform sample and repeating (b);

(d)   repeating (c) a plurality of times to generate a sequence of said successive cyclical sound waveform samples corresponding to a plurality of said cycles; and

(e)   outputting the samples of said sequence to generate a waveform representing a cyclical sound.

3. (Twice Amended) A method according to claim 1 in which said transformation data [defining said transformation] does so by reference to a predetermined reference waveform sequence.

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6. (Twice Amended) A method according to claim 5 in which said <u>transformation</u> data [defining said transformation] does so by reference to a predetermined reference waveform sequence and <u>in which said transformation data represents a</u> [the] transformation <u>which</u> approximates [that] <u>a transformation</u> which would transform a first displacement vector, extending from a first time point on said reference waveform sequence to a corresponding time point on the waveform to be synthesised, to a second displacement vector extending from a second point, successive to the first, on said reference waveform sequence to a corresponding second point on the waveform to be synthesised.

8. (Twice Amended) A method according to claim 1, in which said step (b) comprises calculating said transformation <u>data</u> from a set of stored waveform values.

18. (Amended) [A method of generating a cyclical sound waveform corresponding to a sequence of substantially similar cycles, said method] <u>Synthesis apparatus</u> comprising:

(a)   means for generating a cyclical sound waveform sample;

(b)   means for generating a successive cyclical sound waveform sample from said cyclical sound waveform sample and <u>transformation</u> data<u>, wherein said transformation data comprise data</u> defining <u>the evolution of</u> [a transformation followed by] said cycles in a temporal vicinity of said cyclical sound waveform <u>and the change in shape of said cycles in said temporal vicinity from cycle to cycle</u> [sample];

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(c)   means for designating said successive cyclical sound waveform sample

as a <u>cyclical</u> [cyclic] sound waveform sample and repeating (b);

(d)   means for repeating (c) a plurality of times to generate a sequence of said

successive cyclical sound waveform samples corresponding to a plurality of said cycles;

and

(e)   means for outputting the samples of said sequence to generate a

waveform representing a cyclical sound.

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